

# **RISK IN CONSTRUCTION SUBCONTRACTING**

**An Independent Study**

**by:**

**Deborah E. Roe**

**Submitted to the Office of Graduate Studies**

**College of Architecture**

**Texas A&M University**

**in Partial Completion of the Requirements for the Degree of**

**Master of Science**

**Construction Management**

**August 1997**

**Graduate Advisory Members:**

**Dr. Nancy L. Holland**  
(Committee Chairman)

**Dr. James W. Craig**

**Dr. George O. Rogers**

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## **Abstract**

Risk is inherent in every aspect of the construction industry. This risk is allocated by the contract documents which establish the relationships between the parties in a construction contract. Often, when risk is not appropriately proportioned in a contractual agreement, contractors and subcontractors add significant premiums, or risk allowances, to their bids to reduce the potential negative consequences if the risk event occurs. This paper investigates the risks in construction contract agreements which general contractors and subcontractors indicated most affects their bids as suggested by the frequency with which a contingency for risk is included. It also investigates the contractor's success in gaining a time extension or claim for additional cost for the same conditions. Survey results indicate that both general contractors and subcontractors generally feel that contract provisions are fair; however, they often include an allowance for risk in their bids depending on their level of perceived risk.

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## Introduction

Construction is one of the most dynamic, challenging, and risky industries today. From start to finish, risk is inherent in every construction project and administrative decision. The contractor is continually faced with a variety of situations involving many unknown, unexpected, frequently undesirable, and often unpredictable factors.

The contractual relationships formed in a construction project define the duties, responsibilities, and liabilities of each party and allocate risks between them. Although risk cannot be eliminated, its effects can be minimized by forming fair and equitable contracts. Identifiable risks should be allocated to the party who has the competence, expertise, and resources to exercise reasonable control over the risk event. This concept, often called risk sharing, attempts to evaluate risks on a construction project and specifically allocate each identifiable risk to the appropriate party (Zack, 1996). Specifically, since a substantial amount of work on any construction project is typically accomplished by subcontractors, fair and equitable subcontract conditions are of prime importance to the success of the project. If a breakdown occurs in only one of many subcontracts on a single project, causing a delay, claim, or both, it most likely will affect other contracting parties, including the client. Cost and time overruns may be inevitable.

General contractors and subcontractors, upon reviewing a bid request, evaluate the time, cost, and conditions of the project to form their bids. Contractors also will evaluate the risk allocated by the contract conditions and add an allowance, or contingency, based on their perception of the risk. The contingency acts as a means of security to protect their interests in the event of a risk occurrence. Very often contingency premiums are added to the bid cost "intuitively" as a result of past experiences and judgment (Al-Bahar and Crandall, 1990). Risk allowances placed in a bid may increase the total cost to the owner, extend the project schedule, or both.

Additionally, subcontractors faced with the occurrence of a risk event, which potentially will increase the cost and/or calendar duration of the project, will not accept these losses without initiating minimizing actions. They will adjust their speed of work or resource allocations to the project in order to increase or regain control and minimize the overruns (Birrell, 1985), often at

the expense of quality. Furthermore, if the subcontractor has not included an adequate risk allowance in its bid, and cannot reduce its losses by other means, it may be forced into bankruptcy. Thus the owner, by allocating certain risks to the general contractor which are typically passed through to subcontractors, may inadvertently assume the additional risk of reduced quality, increased latent defects, and unnecessary contract delays due to a subcontractor's financial instability.

Risk sharing and the proper allocation of risk lead to diminished risk for all parties, reduction in disputes, and an improved quality in workmanship. Most importantly, contingencies placed in bids as protection from the occurrence of risk events, will be reduced and lead to an overall project cost based only on the events which actually occur and not on risk events which *might* occur.

The purpose of this paper is to present the most critical subcontract conditions which may affect a contractor's bid. These conditions are indicated by the frequency with which randomly selected general contractors and subcontractors, responding to a survey, stated they may add a risk allowance to their bid. The paper begins with a general discussion and definition of risk, including an overview of risk in the construction industry. It then presents a discussion of the survey findings, followed by a conclusion and inferences drawn from the survey.

## **Understanding Risk - A General Discussion**

### **Definition of Risk**

The definition of risk, like that of many key management terms, is inherently controversial. The word "risk" has been known by many different definitions and used in varying contexts. However, the choice of definition becomes important because researchers and society make these definitions work in their favor to express particular views. The simple choice of definition can affect the outcome of debates and research, the allocation of resources, and many other aspects of industry and society (Fischhoff, Hope, and Watson, 1984).

Existing literature often uses the terms risk and uncertainty interchangeably. Although the effects may be similar, the terms imply different meanings. As will be shown, uncertainty will be used to represent the probability that an event occurs; thus a "certain" event has no uncertainty. Risk, generally, involves two major components: (1) the existence of a possible unwanted consequence or loss, and (2) an uncertainty in the occurrence of that consequence which can be expressed in the form of a probability of occurrence. The consequence implies a negative value to the risk taker, i.e. a loss or damage, something to be avoided. Risk takers often willingly expose themselves to risks to obtain some possible gain. Rowe (1977) therefore, associates risk with the consequences that involve losses to the risk taker:

***Risk is the potential for realization of unwanted, negative consequences of an event.***

It should be noted however, that there is also an opposite, positive side or opportunity such as profit or gain. Al-Bahar and Crandall (1990) further define risk as:

***"The exposure to the chance of occurrences of events adversely or favorable affecting project objectives as a consequence of uncertainty."***

With this definition, Al-Bahar and Crandall (1990) characterize risk by:

***The risk event:*** what might happen to the detriment (or favor) of the project.

***The uncertainty of an event:*** How likely the event is to occur, i.e., the chance of the event occurring. A sure or certain event does not create a risk, although it may create a loss or gain.

***Potential loss / gain:*** the necessary amount of loss or gain as a consequence of the risk event. In addition to the financial consequences, loss includes personal injury and physical damage, and gain includes profit and benefit.

Therefore, uncertainty and potential loss or gain are necessary conditions for riskiness. Therefore, symbolically written:

$$\text{Risk} = f(\text{Uncertainty of an event, Potential loss / gain from an event})$$

### **The Nature of Risk**

Some economists believe that all true profit is related to risk, and if there were no risk involved in business, neither could business generate any profit. In fact, compensation for risk is often considered as one of the basic elements making up profit (Park, 1979). Risk cannot be completely eliminated and to minimize risk to what may seem an acceptable or minimum level can be cost prohibitive. If all risk were eliminated from the construction industry (practical only in theory), the return on investment would most likely be so low, companies would not find it worthwhile to remain in business.

An interesting concept, and one which must be understood, is that the only way to eliminate risk is to do nothing - and in business, this is actually the greatest, most disastrous, risk of all. The "do nothing" alternative to minimizing risk most certainly also eliminates any potential gain from the completion of a successful business venture, and any other available alternatives will not be without risk. Wildavsky (1979) presents the idea that "reducing risks is not riskless," neither for the one attempting to reduce risk, nor for others who will be affected by the decision. Risks

cannot be reduced for everyone and attempting to lower risks routinely only displaces the risk to other areas. Another major point which Wildavsky makes is that by reducing risks to such small levels, the future may be sacrificed by eliminating in the present what may be a future choice. With these concepts in mind, the contractor's concern should not be with eliminating risks, but should be directed toward selecting the right risks to be taken.

Another important concept concerns a general classification of risk and includes risks of both a technical or economic nature. There are four broad categories of risk involved in the contracting business (Park, 1979). The categories include risks which:

- are inherent in the business - simply to be engaged in the business at all entails a great deal of risk, and these risks *must* be taken.
- should be taken - the risks assumed in pursuing opportunities for profits.
- are too great to be taken - the risks for which the potential impact cannot be eliminated or reduced to an acceptable level. These risks are usually of an economic nature, since technical risks can be allowed for and reflected in the bid price.
- are too good not to take - where the possibility of very high rewards outweighs the high risk involved.

### **Risk Allocation in Construction Contracts**

The construction contract is an instrument that defines the duties, rights, and responsibilities of each party. Parties to the construction process - owners, architects/engineers (A/E), general contractors and subcontractors - are becoming increasingly aware of contract risks and the allocation of those risks to the various parties. The responsibility for indemnifying the consequences of a risk event once it occurs should ideally rest with the party who has the most control over the risk, e.g. the party best able to manage them. According to Edwards (1995), the requirement for those to whom risk is being transferred includes:

- ability to undertake a hazardous task;
- willingness to take the risk;
- financial capability if the risk event occurs; and
- continued existence and adequate finance during period of liability.

In practice however, the best policy in allocating risk is not always observed. Typically, it is the owner, with the help of the A/E, who establishes the initial contract framework for risk allocation. Many private owners may make a conscious decision not to allocate certain kinds of unforeseeable risks to their contractors such as varying subsurface conditions, changed site conditions, or delays caused by active interference such as excessive change orders. The rationale is that if the owner bears the risk, the contract price will more accurately reflect the cost of the work. Risks that are difficult to quantify will not be a factor in the work. In contrast, other owners, including many public owners, try to make accurate budget projections for the coming year and, without regard for the cost of work or possible windfalls to contractors, choose to allocate these types of risks to the contractor. It should be recognized that whatever uncontrollable risks an owner may arbitrarily allocate to the contractor, may be bought back through bid contingencies, change orders, claims, and litigation. Nonetheless, relief of contractors from all controllable risks would simply promote contractor inefficiency; and pricing controllable risks provides contractors with both the opportunity for profit and the incentive to control costs (Kuesel, 1979).

In the majority of contracts, risks are invariably allocated by the owner to one or the other of the contracting parties, and likewise, the general contractor will allocate risks to the subcontractor (Hartman & Snelgrove, 1996). If the general contractor elects to accept the risks transferred by the owner in the contract, he can tender his bid. If not, he has lost the chance to acquire the job and realize a profit. If the risk is accepted, the general contractor may then choose to pass that risk on to the subcontractor. The subcontract then carries the general contractor's risk as allocated by the owner, and often the general contractor will add a few more (Manzi, 1985; Hinze & Tracey, 1994). For instance, subcontracts frequently contain a no-damages-for-delay clause which was not present in the owner/prime contract. In order to evaluate the risks that are imposed on the subcontractor, a careful examination of the subcontract is necessary.

## **Contractor Survey**

### **Objective**

The objective of the survey was concerned with the identification of the risks in construction contract agreements, if any, which are perceived by general contractors and subcontractors as affecting their bids. The first part of the questionnaire was directed toward the frequency with which standard, nonstandard and contractor written forms are used and the contractor's perceived fairness of the standard forms. The second part of the questionnaire was twofold, focusing on the identification of perceived risks in the subcontract general conditions, and in various contract delays, errors and omissions. The perceived risks are indicated by the contractor's willingness to add a risk allowance in their bids, either for time or dollars, or both. Finally, the general contractors' and subcontractors' success in gaining a time extension or claim for additional cost for the same delays, errors, and omissions is investigated. A copy of the survey, Risk in Subcontracting, is included in the appendix.

### **Methodology and Analysis**

The study was conducted utilizing a questionnaire prepared by Dr. N. L. Holland, assistant professor of Construction Science, Texas A&M University. Surveys were sent to 212 contractors, randomly selected from the membership of the Associated Builders and Contractors (ABC). The ABC membership was used to select the contractors because it provided the best mixture of general contractors and subcontractors. The returned questionnaires and raw data were gathered by Dr. Holland between April and May 1995. A second mailing to the non-respondents was performed in June of 1995. The response rate was low with only 61 surveys (28.8%) returned. Of the total respondents, 24 (39.3%) were classified as general contractors and 37 (60.7%) as subcontractors based on their response to a direct question regarding the type of firm: General Contractor or Specialty Contractor.

Because of the low response rate and since the survey only considered ABC contractors (nonunion), the information is only representative of those surveyed and should not be used to

characterize the construction industry. The process used to analyze and evaluate the responses was to draw inferences from the information provided and observe the commonalities, differences, and trends. For the above reasons, the sample does not readily lend itself to statistical analysis.

The analysis and evaluation of the responses rests on two basic assumptions. First, the frequency with which the contractors add a risk allowance in their bids is directly related to the perceived risk for that condition or risk event. Several independent studies concerning risk allowances included in contractor's bids have established this relationship in varying degrees (DeNeufville and King, 1991; Uher, 1991). Second, the evaluation only considers the responses as they may apply to non-negotiated contracts such as firm fixed price contracts. This assumption is reasonable due to the concentrated use of these contract types.

### **Contractor Characteristics**

The characteristics of the construction firms who responded to the questionnaire are presented in Table 1, Characteristics of Responding Firms. The typical respondent was a privately held corporation, nonunion, whose gross revenues ranged between one to ten million dollars. Very few of the contractors were new to the industry. Only 8.6% had been in business for less than five years (all subcontracting firms), with 44.8% in business over 15 years and 27.6% in business between ten and fifteen years.

Most respondents indicated they performed construction work in several categories, the most common areas being Commercial / Building, Industrial, Institutional and Residential. Eighty percent of the total respondents were engaged in commercial construction with industrial (50.8%) and institutional contractors (42.6%) the next most predominate. The majority of subcontractors (31 of 35 responding) accomplished at least 75% of their work with their own forces while the general contractors generally accomplished less.

**Table 1: Characteristics of Responding Firms**

CATEGORY	TOTAL RESPONSES No.	TOTAL RESPONSES %	GENERAL CONTRACTORS No.	GENERAL CONTRACTORS %	SUBCONTRACTORS No.	SUBCONTRACTORS %
<b>TYPE OF FIRM</b>	61	100	24	39.3	37	60.7
<b>GROSS REVENUES</b>	61					
\$200,000 to \$500,000	1	1.6	1	1.6	0	0.0
\$500,000 to \$1,000,000	8	13.1	3	4.9	5	8.2
\$1,000,000 to \$10,000,000	40	65.6	10	16.4	30	49.2
> \$10,000,000	12	19.7	10	16.4	2	3.3
<b>STRUCTURE OF FIRM</b>	61					
Sole Proprietor	4	6.6	2	3.3	2	3.3
Partnership	3	4.9	1	1.6	2	3.3
Privately Held Corporation	54	88.5	21	34.4	33	54.1
Publicly Held Corporation	0	0.0	0	0.0	0	0.0
<b>LABOR</b>	58					
Non-Union	51	87.9	18	31.0	33	56.9
Union	5	8.6	4	6.9	1	1.7
Double Breasted	2	3.4	1	1.7	1	1.7
<b>WORK WTH OWN FORCES</b>	58					
0% to 25%	7	12.1	7	12.1	0	0.0
26% to 50%	8	13.8	6	10.3	2	3.4
51% to 75%	10	17.2	8	13.8	2	3.4
76% to 100%	33	56.9	2	3.4	31	53.4
<b>YEARS IN BUSINESS</b>	58					
1 to 5	5	8.6	0	0.0	5	8.6
5 to 10	11	19.0	4	6.9	7	12.1
10 to 15	16	27.6	8	13.8	8	13.8
> 15	26	44.8	11	19.0	15	25.9
<b>TYPE OF WORK</b>	61					
Residential	18	29.5	5	8.2	13	21.3
Highway/Bridges	10	16.4	7	11.5	3	4.9
Institutional	26	42.6	7	11.5	19	31.1
Commercial / Building	49	80.3	16	26.2	33	54.1
Industrial	31	50.8	8	13.1	23	37.7
Power	3	4.9	0	0.0	3	4.9
Waste / Waste Water Treatment	7	11.5	5	8.2	2	3.3
Other	8	13.1	3	4.9	5	8.2

## **Subcontract Conditions**

### **Knowledge of Subcontract Conditions**

Often, the success or failure of a construction project is related to the ability of the owners, general contractors and subcontractors to enter into fair and equitable agreements. Each contract associated with a particular construction project assigns responsibilities, obligations, and rights to each party. The general contractor, through its prime contract with the owner, accepts the responsibilities and risks associated with the construction project, and in turn may retain or transfer all or part of these risks to his subcontractors. Particularly important in their formal agreement are the terms defined in the general conditions (provisions) of the contract. The general conditions typically define relationships such as terms of payment, commencement and completion times, differing site conditions, contract delays, contract changes in work or scope, cost increases and time extensions. All of these areas may contain substantial risk for the retaining party and should be allocated equitably. The terms of the contract and each party's understanding (interpretation) of the terms, may be the key to working together in an efficient and productive manner. Misunderstandings increase the probability of a conflict between the contractor and subcontractor - increasing the time and/or cost to the owner.

Since understanding the contract terms is such an important factor to success, it was surprising to find that, although they make a conscious effort, more contractors did not insist on knowing these general conditions before entering into a formal, written agreement. Table 2, Knowledge of Subcontract Conditions, shows the results of the survey question "Do you insist that you know subcontract conditions related to a job when preparing a bid." As shown, only 42% of the general contractors and even less, only 32%, of the subcontractors, stated they **ALWAYS** knew the subcontract conditions related to a job when preparing a bid. Additionally, 5% of the subcontractors stated they **NEVER** knew the subcontract conditions. Overall, the survey indicated that the general contractors who responded more often insisted they knew the subcontract conditions than the subcontractors. This may be because the general contractors made a more conscious effort to know the terms of agreement or may simply be a reflection of their perceived knowledge since they are most often the drafter of the contract.

**Table 2: Knowledge of Subcontract Conditions**

Respondent	Rate	Knowledge of Subcontract Conditions				
		Always	Usually	Sometimes	Never	NA
General Contractors	%	41.7	41.7	16.7	0.0	0.0
	No.	10	10	4	0	0
Subcontractors	%	32.4	32.4	29.7	5.4	0.0
	No.	12	12	11	2	0
Total Responses	%	36.1	36.1	24.6	3.3	0.0
	No.	22	22	15	2	0

Another similar and equally important issue was discussed as part of another survey conducted by Hinze and Tracy (1994).<sup>1</sup> After a subcontractor has been notified of being the low bidder on a subcontracted item, the next major step is for the general contractor and subcontractor to enter into formal agreement. While the bid submitted by the subcontractor may, in some states, obligate the subcontractor to perform the work for the general contractor (under the principle of promissory estoppel), the specific terms of their agreement may still involve some negotiation. Often it is necessary to determine what the subcontractor has included in his bid or other specifics to ensure there is a meeting of the minds. According to subcontractors participating in the study by Hinze and Tracy (1994), the pre-award negotiations generally take place in face-to-face meetings. It was interesting to note that 28% of the respondents had no type of communication with the general contractor prior to signing the subcontract agreement.

### **Use of Subcontract Forms**

There are many types of contract forms, each with a wide range of liabilities included between parties. Each contract allocates risks differently between the parties. No one contract form can cover all possible situations, and contracts may need careful study to determine what these are. It is possible therefore, to select one which is more ideally suited to each party's requirements and, if

<sup>1</sup> The study was a nonrandom study conducted in the Puget Sound Area with a total of 28 subcontracting firms represented, which included practices related to entering into subcontract agreements.

necessary, to amend it to be more effective. The most common types of written agreements which will be considered include:

- American Institute of Architects (AIA),  
AIA201 - General Conditions of the Contract for Construction,  
AIA401 - Standard Form of Agreement Between Contractor and Subcontractor,
- Associated General Contractors (AGC) Document No. 600 - Subcontract for Building Construction,
- other standard document forms such as the Engineers Joint Contract (EJC),
- nonstandard forms, published for use in construction contracts by other than the organizations listed, and
- contractor written agreements.

The survey investigated the frequency of use of the different forms by contractors and subcontractors. The results, summarized in Table 3, Use of Subcontract Forms, suggest that no particular form was favored as a whole by the contractors or subcontractors who responded. The AIA form was utilized more by general contractors, as seen by 25% of general contractors compared to 13% of the subcontractors who stated they used the AIA documents at least 75% of the time. In contrast, 30% of both general contractors and subcontractors used nonstandard forms at least 75% of the time. The survey also showed that 29% of the general contractors, compared to 16% of the subcontractors, wrote their own contracts 75 - 100 % of the time. This may be a deceiving figure if, as found in the Hinze & Taylor (1994) survey, contractors did not differentiate between modified standard forms and wholly contractor written agreements.

Table 3: Use of Subcontract Forms

Respondent	Rate	AIA				Non-Standard				Write Their Own				NA		
		0 - 25	26 - 50	51-75	76-100	NA	0 - 25	26 - 50	51-75	76-100	NA	0 - 25	26 - 50	51-75	76-100	
General Contractors	%	41.7	16.7	16.7	25.0	0.0	37.5	16.7	12.5	29.2	4.2	54.2	8.3	8.3	29.2	0.0
General Contractors	No.	10	4	4	6	0	9	4	3	7	1	13	2	2	7	0
Subcontractors	%	48.6	24.3	10.8	13.5	2.7	32.4	18.9	16.2	29.7	2.7	59.5	16.2	8.1	16.2	0.0
Subcontractors	No.	18	9	4	5	1	12	7	6	11	1	22	6	3	6	0
Total Responses	%	45.9	21.3	13.1	18.0	1.6	34.4	18.0	14.8	29.5	3.3	57.4	13.1	8.2	21.3	0.0
Total Responses	No.	28	13	8	11	1	21	11	9	18	2	35	8	5	13	0

## Fairness of Standard Subcontract Conditions

It can often be a battle of contract forms between the subcontractor and the general contractor. Sources in the past have suggested that subcontractors often end up coming out on the loosing end (Currie, Sweeney, & Hafer, 1991; Uher, 1991). Reasons suggested include the need for work and therefore the willingness to accept less than equitable terms, or perhaps simply a lack of time. Whether this is a changing trend or not is left for a more detailed study; however, no such bias was evident in the perceived fairness of standard subcontract general conditions from the respondents in this survey. The overwhelming response from both general contractors and subcontractors ranged from neutral to very fair. Overall, only 14.8% of the respondents considered subcontract conditions to be unfair as indicated by a 1 or 2 response in the survey. Results are shown below in Table 4, Fairness of Standard Subcontract Conditions.

**Table 4: Fairness of Standard Subcontract Conditions**

Respondent	Rate	Fairness of Subcontract Conditions					
		Fair = 5	4	3	2	Unfair = 1	NA
General Contractors	%	4.2	33.3	50.0	12.5	0.0	0.0
	No.	1	8	12	3	0	0
Subcontractors	%	10.8	29.7	35.1	13.5	2.7	8.1
	No.	4	11	13	5	1	3
Total Responses	%	8.2	31.1	41.0	13.1	1.6	4.9
	No.	5	19	25	8	1	3

## Risk Allowance in Bids

### **Bid Contingencies - Increased Cost of Contracts**

When risk is not appropriately proportioned in a contractual agreement, the negatively affected parties naturally express concern about conditions they feel are unfair and which may affect their profitability. Often this concern is reflected by the inclusion of appropriate risk allowances or contingencies in their bids (Uher, 1991).

To understand the risks allocated to it, the contractor must read and interpret the contract, then identify and understand the risks which are assigned under the contract terms and conditions. Edwards (1995) suggests that identified residual risks that a contractor cannot transfer or which are believed to be outside insurance coverage should be assessed for significance and an appropriate adjustment made to the tender sum. Traditionally, cost estimates are based on available data gathered from actual costs on previous contracts and experience, and thus implicitly include an assessment of the costs of risk within them. The actual tender price is often the best guess cost estimate plus a percentage adjustment and does not normally include a detailed risk by risk evaluation, not least because of time (Edwards, 1995).

Results of an empirical study conducted by DeNeufville and King (1991) as part of a bid-simulation exercise, indicated that "In general, the contractors appeared to have two ways for compensating for risk when developing a bid: One is to develop a standard cost estimate not considering risk, and varying the markup depending on the risk. The second method is to develop a cost estimate that adjusts productivity factors or adds contingencies based on the risk of each item being estimated, and then applying a standard markup to this risk-compensated estimate. Most contractors stated they used the latter method; a few used a combination of both." Their bid-simulation experiment indicated that contractors systematically add a premium to their bids to account for both the riskiness of a project and their lack of enthusiasm to do a job when they do not need the work. The risk allocation in their bids was on the order of 3% of the total cost of the project and these premiums appear to be additive (DeNeufville and King, 1991). The important

fact is that these premiums represent a significant percent of the total cost of the project, comparable to the contractor's own markups above cost.

### **Risk Allowances for "Biased" General Conditions**

As a first step in identifying risks perceived by the respondents in construction contracts, the questionnaire focused on the frequency with which the contractors were willing to add a risk allowance for "biased" subcontract general conditions. Table 5, Risk Allowance in Bid for "Biased" Subcontract General Conditions, displays the responses to the question "Do you make risk allowances in your bid for subcontract general conditions you feel are biased against you?" The survey showed that 48% of the subcontractors responding USUALLY or ALWAYS added an allowance to their bids for risk. Additionally, 21% of the general contractors responded that they also USUALLY or ALWAYS added a contingency. Depending on the specific contract clause and each party's interpretation, both parties could feasibly add an allowance to their bid, thus increasing the cost to the owner.

**Table 5: Risk Allowance in Bid for "Biased" Subcontract General Conditions**

<b>Respondent</b>	<b>Rate</b>	<b>Risk Allowance for "Biased" Subcontract General Conditions</b>				
		<b>Always</b>	<b>Usually</b>	<b>Sometimes</b>	<b>Never</b>	<b>NA</b>
<b>General Contractors</b>	%	4.2	16.7	54.2	25.0	0.0
	No.	1	4	13	6	0
<b>Subcontractors</b>	%	27.0	21.6	37.8	13.5	0.0
	No.	10	8	14	5	0
<b>Total Responses</b>	%	18.0	19.7	44.3	18.0	0.0
	No.	11	12	27	11	0

The survey also asked “Do you add extra days to the schedule for activities with a high potential for being delayed by weather?” and “Do you add extra dollars to contingency when the project has a high potential for being delayed and the Liquidated Damages (LDs) assessed are high?” The results are shown in Table 6, Extra Days Added to Schedule for High Potential of Weather Delays, and Table 7, Extra Dollars Added for High Potential of Delays with High Liquidated Damages, respectively. For these two instances, the general contractors were more likely to add a contingency than the subcontractors. Here again, it is feasible that the contractor may add a contingency to its bid on top of the contingency already included by the subcontractor.

**Table 6: Extra Days Added to Schedule for High Potential of Weather Delays**

Respondent	Rate	Days Added for Weather Delays		
		Yes	No	Sometimes
General Contractors	%	50.00	16.67	33.33
	No.	12	4	8
Subcontractors	%	43.24	32.43	24.32
	No.	16	12	9
Total Responses	%	45.90	26.23	27.87
	No.	28	16	17

**Table 7: Extra Dollars Added for High Potential of Delays with High Liquidated Damages**

Respondent	Rate	Dollars Added for Liquidated Damages		
		Yes	No	Sometimes
General Contractors	%	75.00	4.17	20.83
	No.	18	1	5
Subcontractors	%	54.05	13.51	32.43
	No.	20	5	12
Total Responses	%	62.30	9.84	27.87
	No.	38	6	17

Typically, for areas of risk not caused by the actions of either party, standard forms of contract usually share the risk between them. For example, delays due to adverse weather the risk is often apportioned according to whether the conditions are exceptional or otherwise. The reasoning is that for the owner, it is usually deemed uneconomic for contractors to accept and include in their tender the price for risk associated with exceptional weather conditions (Currie, et al., 1991; Edwards, 1991). Still, Table 6 indicates that 50% of the general contractors and 43% of the subcontractors responding to the survey said they add extra days to their schedule for an activity which has a high potential of being delayed by weather. This is despite the fact that weather is usually one of the construction contracting risks which is more equitably shared by the contract parties. A partial explanation for this seeming controversy may be in determining the standards which constitute "exceptional" weather. Contractors may have difficulty in verifying and/or agreeing on the conditions which will invoke this 'equitable contract provision' when actually negotiating claims.

Contractors responding to the survey were even more likely to add extra dollars to their bids for high financial risk. Table 7 indicates the frequency with which the respondents would add extra dollars for high potential of delays when the liquidated damages to be assessed are high. Seventy-five percent of the general contractors responded YES, they would add extra dollars to their bids when there was a high potential of delays and the liquidated damages assessed were high, compared to 54% of the subcontractors. Overall, only 10% of the respondents would *not* add extra dollars to their bids.

### **Frequency of Risk Allowance in Bids**

Inclusion of demanding conditions in a contract is perceived by the negatively affected party as a critical issue which leads to uncertainty. To determine the contract conditions which contractors felt were more critical and for which they were more likely to add a monetary or time contingency in their bids, the survey focused on eleven major contract conditions. For each condition, the respondent answered the question "With what frequency do you make time or monetary risk allowances in your bid?"

The contract conditions included in the survey were:

- Terms of payment
- Changed quantities
- Fluctuating material and labor costs
- Liquidated damages
- Completeness of contract documents
- Retention release date
- Delays and cost of delays
- Short notice to commence work
- Extension of time
- Transfer of responsibility
- Cost of arbitration

Table 8, Frequency of Risk Allowance in Bid, presents the survey responses for each contract condition presented. Overall, the responses were consistent with previous findings which indicated that the subcontractors were more likely to add an allowance to their bids for risk than the general contractors. To speculate as to the reason for this would require a more in-depth study; however, several factors may be influential including: competitiveness, need for work, whether the risk is retained or passed to the subcontractors, and the level of the perceived risk.

It is interesting to note that the contract conditions perceived to be the most critical by the general contractors surveyed were not the same as those indicated by the subcontractors. In fact, the two most critical conditions to the general contractors - changed quantities and liquidated damages - were among the least critical to the subcontractors. Much of the dissimilarity noted arises due to the difference in their perceived level of risk - the uncertainty of the conditions and their potential loss - and weighs heavily on the ability of the contractor to exercise reasonable control over the risk. Another influencing factor in determining the perceived risk may be the contractor's history of success in securing monetary and/or time extensions and in winning claims concerning the risk in question.

**Table 8: Frequency of Risk Allowance in Bid**

Contract Condition		General Contractors					Subcontractors					Total Respondents							
		Rate	Always	Usually	Sometimes	Almost	Never	NA	Always	Usually	Sometimes	Almost	Never	NA	Always	Usually	Sometimes	Almost	Never
Terms of Payment	%	16.7	16.7	33.3	33.3	0.0	0.0	24.3	32.4	24.3	10.8	5.4	2.7	21.3	26.2	27.9	19.7	3.3	1.6
	No.	4	4	8	8	0	0	9	12	9	4	2	1	13	16	17	12	2	1
Changed Quantities	%	33.3	37.5	16.7	8.3	0.0	4.2	24.3	10.8	24.3	29.7	8.1	2.7	27.9	13.1	29.5	21.3	4.9	3.3
	No.	8	9	4	2	0	1	9	4	9	11	3	1	117	8	18	13	3	2
Fluctuating Material and Labor Costs	%	8.3	25.0	37.5	29.2	0.0	0.0	18.9	21.6	45.9	8.1	2.7	2.7	14.8	23.0	42.6	16.4	1.6	1.6
	No.	2	6	9	7	0	0	7	8	17	3	1	1	9	14	26	10	1	1
Liquidated Damages	%	16.7	29.2	41.7	8.3	0.0	4.2	10.8	21.6	37.8	18.9	8.1	2.7	13.1	24.6	39.3	14.8	4.9	3.3
	No.	4	7	10	2	0	1	4	8	14	7	3	1	8	15	24	9	3	2
Completeness of Contract Documents	%	8.3	16.7	54.2	12.5	8.3	0.0	18.9	24.3	24.3	21.6	8.1	2.7	14.8	21.3	36.1	18.0	8.2	1.6
	No.	2	4	13	3	2	0	7	9	9	8	3	1	9	13	22	11	5	1
Retention Release Date	%	0.0	37.5	25.0	33.3	4.2	0.0	18.9	32.4	10.8	18.9	16.2	2.7	11.5	34.4	16.4	24.6	11.5	1.6
	No.	0	9	6	8	1	0	7	12	4	7	6	1	7	21	10	15	7	1
Delays and Cost of Delays	%	8.3	25.0	29.2	33.3	0.0	4.2	13.5	29.7	18.9	24.3	10.8	2.7	11.5	27.9	23.0	27.9	6.6	3.3
	No.	2	6	7	8	0	1	5	11	7	9	4	1	7	17	14	17	4	2
Short Notice to Commence Work	%	0.0	20.8	45.8	33.3	0.0	0.0	10.8	24.3	29.7	24.3	8.1	2.7	6.6	23.0	36.1	27.9	4.9	1.6
	No.	0	5	11	8	0	0	4	9	11	9	3	1	4	14	22	17	3	1
Extension of Time	%	8.3	12.5	45.8	29.2	4.2	0.0	8.1	13.5	54.1	10.8	2.7	8.2	13.1	50.8	18.0	8.2	1.6	
	No.	2	3	11.0	7	1	0	3	5	20	4	1	5	8	31	11	5	1	
Transfer of Responsibility	%	0.0	4.2	54.2	37.5	4.2	0.0	16.2	13.5	21.6	29.7	13.5	5.4	9.8	34.4	32.8	9.8	3.3	
	No.	0	1	13	9	1	0	6	5	8	11	5	2	6	21	20	6	2	
Cost of Arbitration	%	0.0	12.5	8.3	58.3	20.8	0.0	8.1	16.2	2.7	24.3	43.2	5.4	4.9	6.6	13.1	37.7	34.4	3.3
	No.	0	3	2	14	5	0	3	6	1	9	16	2	3	4	8	23	21	2

Table 9, Summary of Responses Indicating Most Critical Contract Conditions, ranks the contract conditions in descending order with the condition perceived as the most critical by the respondents first. Only the top eight responses are included. This arbitrary ranking was obtained by adding the contractor's responses of ALWAYS and USUALLY, with SOMETIMES used as the deciding weight in case of ties.

**Table 9 : Summary of Responses Indicating Most Critical Contract Conditions**

<b>GENERAL CONTRACTORS</b>	<b>%</b>	<b>SUBCONTRACTORS</b>	<b>%</b>
Changed Quantities	70.8	Terms of Payment	56.7
Liquidated Damages	45.9	Retention Release Date	51.3
Retention Release Date	37.5	Completeness of Contract Documents	43.2
Fluctuating Material and Labor Costs	33.3	Delays and Costs of Delays	43.2
Terms of Payment	33.4	Fluctuating Material and Labor Costs	40.5
Delays and Costs of Delays	33.3	Short Notice to Commence Work	35.1
Completeness of Contract Documents	25.0	Changed Quantities	35.1
Short Notice to Commence Work	20.8	Liquidated Damages	32.4

#### Terms of Payment

Payment is most important to firms involved in the construction process. Because of the large volume of work (in dollars) and the relatively low profit margin which is typical in the construction industry, contractors must maintain a high velocity of cash flow. Over a given period of time, the contractor must take in and pay out a large amount of cash.

The problem, and inherent risk, is that there is not a lot of room for errors. For example, if a portion of work is not accepted, or for any other reason the contractor is not paid, the break in the cash flow may cause serious effects on the company's financial stability.

The "terms of payment" establish any prerequisite and subsequent factors which determine how much and when a contractor will be paid, including the right to final

payment. The survey showed that terms of payment was perceived by the subcontractors as the most critical or risky subcontract condition with 56.7% stating they USUALLY or ALWAYS add a risk allowance in their bid, in contrast to 33.3% of the general contractors. For subcontractors, the exposure to risk is the greatest with a contingent payment clause in the subcontract. This “pay-when-paid” condition, such as in AIA Document A201 ¶ 9.6.2 and AGC Document 600 ¶5.2.5, requires the contractor to pay the subcontractor “promptly,” but only “upon receipt of payment from the owner.” The subcontractor generally may obtain appropriate information concerning the percentage of completion and/or amounts requested by the general contractor for his own particular portion of work. However, under the laws of most jurisdictions, when the subcontractor does not receive payment rightfully due from the general contractor, the subcontractor is barred from suing the owner because of lack of privity of contract (Currie et al., 1991). Thus, there is no guarantee as to when payment is to be made. Additionally, without statutory protection or similar contract provision, the subcontractor may be at the mercy of the unscrupulous contractor who diverts payments properly due to the subcontractor.

#### Retention Release Date

The purpose of retention is to maintain the contractor’s interest in completing the project on time and with the expected quality. Retention is especially useful for ensuring the contractor completes the multitude of minor tasks (punch list items) necessary in order for the owner to consider the project completed sufficiently to permit final funding of its construction loan. It is progressively deducted from progress payments to the contractor, typically at 10% of the invoice. In standard subcontract documents, it is typically not to exceed the percentage retained from the general contractor’s payment by the owner. However, this is not always the case. In the exploratory, nonrandom study conducted by Hinze and Tracey (1994), slightly more than a third of the subcontractors stated that the retainage withheld was equal to that withheld from the general contractor. The remaining subcontractors stated the retainage was not the same or they did not know.

Responses in this survey included 51.3% of the subcontractors, compared to 37.5 % of the general contractors, who stated they USUALLY or ALWAYS add a risk allowance to their bids based on the retention release date. None of the general contractors stated they would ALWAYS add a risk allowance. Overall, the subcontractors perceived the retention release date to be more critical than the general contractors. A major factor stems from the fact that a large subcontractor could easily perform 10-20% of the work on a project. The retainage on such a subcontractor's work could be substantial and any interest which might be generated would not be trivial. Additionally, the subcontractor may not receive the retainage promptly after the completion of the project. Such practices of general contractors permit them to finance their operations to a significant degree with the funds earned by but not returned to the subcontractors. In the study conducted by Hinze and Tracey (1994), nine of the 23 subcontractors stated they received the retainage within the first six months after contract completion; five stated it was more than one year after final completion.

#### Changed Quantities

Construction contracts, particularly fixed price, commonly require unit price bidding. Unit pricing necessitates that the bidder make the basic assumption that the estimated quantities will be used and that he will therefore be able to recover his costs from the payments made under those bid items. Contract provisions may allow for a variance in the estimated quantities without equitable adjustment to the contractor. Such variances may be specifically stipulated such as +/- 15% of the original, or, as in AIA Document A201, may be stated such that when changed quantities will cause "substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted." Even a 15% variance on a large unit price item may have a negative (sometimes positive) impact on the contractor.

Additionally, in the absence of separate, lump-sum price items to cover substantial costs such as mobilization and demobilization, the contractor must distribute these among the various unit price items. For instance, to recover the early costs of mobilization, the contractor may be forced to "front load", assigning a high price to those bid items that

cover early work. In effect, under these circumstances the contractor is forced to play a guessing game of whether the early work will involve the quantities anticipated so that he will actually recover the substantial early costs as planned.

The uncertainty in the unit price quantity and the potential loss to a contractor when a quantity is lower than the estimated quantity from which the unit prices were established, stimulates the contractor to put an allowance for that risk in the bid. Changed quantities was the most critical condition noted by the general contractors (70.8%) who were much more likely to ALWAYS or USUALLY add an allowance than subcontractors (35.1%).

#### Delays and Cost of Delays

Delays occur whenever the contractor is unable to perform some portion of the required work as scheduled. Delays are often unpredictable and problems of proof can preclude compensation for the contractor or result in the assignment of liquidated damages to the contractor, thereby creating or increasing the contractor's risk. General contractors (33.3%) and subcontractors (43.2%) responding to the survey, both stated they ALWAYS or USUALLY will include an allowance in their bids to minimize their potential losses. In contrast, none of the general contractors, and only 10% of the subcontractors, stated they NEVER add an allowance for delays.

Subcontractors appear to perceive the risk as more critical than general contractors, possibly because they have very little voice in the administration of a construction project beyond the scope of their own subcontract. Delays in earlier activities can postpone the start of the subcontractor's work, resulting in unanticipated price increases and lost labor availability. The same delays may cause the general contractor to accelerate, directing the subcontractor to complete its work in a shorter period of time. The unanticipated presence of other trades can prevent full access to the subcontractor's work area and reduce productivity. Additionally, the general contractor may agree to changes affecting the subcontractor's work without issuing a corresponding change in the subcontract.

To recover these additional costs, the subcontractor may have to overcome several common subcontract clauses including clauses which limit or exclude delay claims, require compliance with the general contractor's schedule, or require compliance with the disputes and notice provisions of the prime contract. Although there are means for overcoming many of these obstacles, the subcontractor is often hampered by the size of the task. In many instances the cost of preparing and pursuing a claim for delay may be prohibitive, and the subcontractor is forced by practical considerations to absorb losses that are theoretically recoverable.

#### Liquidated Damages

Like retention, liquidated damages are also used as a form of security to ensure the work is completed by the completion date in the contract. Failure to meet the completion date will expose the contractor to the risk of having to compensate the other party for their losses. General contractors in the survey considered liquidated damages to be the second most critical contract condition with 45.9% stating they ALWAYS or USUALLY add a risk allowance for liquidated damages. Subcontractors perceived a lower risk to themselves concerning liquidated damages (32.4%). According to Uher (1991), this may be influenced by the reluctance of the general contractors to use the liquidated damages clause against subcontractors for fear of the higher costs of litigation. Still, the risk of possible liability is too great to be ignored by subcontractors.

#### Completeness of Contract Documents

Completeness of contract documents is considered a more critical condition by many subcontractors with 43.2% of the respondents stating they ALWAYS or USUALLY add a risk allowance, compared to 25.0% of the general contractors. Subcontractors commonly are given only those portions of the contract plans and specifications which apply to their specific specialty or area of work. In doing so, the subcontractor may lack important information such as all the details, or specific information on work practices, and schedules which apply to all trades. The subcontractor also is unable to gain a full understanding of the entire project.

### Fluctuating Material and Labor Costs

Fluctuating material and labor costs are a very real problem both to owners and contractors. In an inflationary environment, a construction delay may cause the contractor's costs for labor, material, and equipment to be increased, or escalated, because they are incurred in a later time period than anticipated. On a short term project, costs are relatively easy to accurately forecast. Additionally, the contractor has more control over the costs and with planning, can minimize the effects of inflation. In the contract agreement, since contractors have greater control over material and labor prices, the majority of the risk typically is allocated to the general contractor, who in turn transfers it to the subcontractors. However, on long term projects, contractor control over material and labor costs is limited and there are difficulties in finding the most efficient way to minimize the effects. Another major influencing factor is that contractors typically cannot accurately assess the magnitude of potential losses involved. This leads to a high degree of risk which they seek to minimize by including an allowance in their bids. Subcontractors (40.5%) were slightly more likely to add the risk allowance in their bids than general contractors (33.3%).

### Short Notice to Commence Work

Short notice to commence work was of particular concern to subcontractors (35.1%) compared to general contractors (20.8%). This is not surprising since the start of a new construction project is typically more predictable, either directly stipulated in the contract or left to the discretion of the general contractor with few contractual guidelines. The general contractor is better able to estimate and plan for the start of a new project. On the other hand, subcontract work begins at varying times throughout the project and therefore is not so well defined. Due to unexpected delays and changes in the general contractor's schedule, the subcontractor may be required to commence work early or may be considerably delayed. This not only impacts the subcontractor's current project, but other projects as well, depending of the availability of its resources.

### Other Contract Conditions

Contract conditions concerning an Extension of Time (21.3%), Transfer of Responsibility (19.6%), and Cost of Arbitration (11.5%) all involve a level of risk for which general contractors and subcontractors may place a risk allowance in their bids. In all three conditions, the subcontractors perceived the risk to be more critical and were more likely to add an allowance in their bids.

## Delays, Errors, and Omissions

### Contract Delays

One of the most important and frequent risks facing a contractor is that of delays. Delays may extend or stop performance entirely and virtually every aspect of a construction project becomes more expensive with time. The cost of delays cannot be ignored or simply absorbed by the owner or contractor. Delay claims have become one of the most common and expensive disputes in construction today and often include elements of suspension and acceleration (Currie, et al., 1991). However, the primary issue in any delay claim is the loss of time, regardless of whether the claim is for a specified amount of liquidated damages or indirect costs which require careful quantification. Delays are established by comparing planned performance against actual performance and establishing causation: why was time lost and who was responsible.

Contract clauses typically allocate the risk of delays in four categories, distinguished by the contractor's ability to recover for lost time (Currie, et al., 1991; Zack, 1996):

- excusable delays: arise from circumstances that were neither within the contemplation of the parties at the time the contract was made nor caused by the fault of either party; the risk is shared in that the delay will justify a time extension for the contractor but no monetary compensation, while the owner rates time and gives up the right to late completion damages for that time.
- non-excusable delays: acts or omissions by the contractor for which the contractor must bear all associated costs.
- compensable delays: caused by the owner, either directly or by its designer or construction manager (or caused by the general contractor in the case of the subcontract); justify both a time extension and additional compensation for the contractor.
- concurrent delays: occur because of two or more simultaneous causes; typically, when common concurrent delays occur, caused by both parties, neither side is afforded relief.

As part of this survey, questions were included concerning whether or not contractors make time and/or cost allowances in their bids for Delays, Errors, and Omissions (D, E, & O) based on different situations. Additionally, contractors were asked whether they were successful in obtaining time or monetary compensation for the same situations. The results of these issues are presented in Table 10, Bid Allowances for Delays, Errors, and Omissions, and Table 11, Success in Gaining Time Extension or Additional Cost.

In general, there were no inconsistencies noted in the survey results which indicate subcontractors are exposed to more harsh contract conditions or suffer a greater impact from delays due to the subcontract conditions. Trends in the general contractors' responses concerning the addition of risk allowances for certain conditions and in negotiating successful claims were, with few exceptions, comparable to the subcontractors' responses. Although a more detailed study would be required to validate, a possible influential factor could be that general contractors are passing their success in negotiating time extensions and additional cost to the appropriate subcontractors.

### **Weather**

Weather is the most common source of excusable delay. The risk lies in the fact that most contracts permit time extensions only for unusually severe weather which could not reasonably be expected. Contractors seeking claims for weather delays must demonstrate that the conditions causing the delay were abnormally severe for that location at that time of year. Additionally, the contractor must show the causal relationship between the delay and weather (Currie, et al., 1991).

Delays due to weather were the most common condition for which general contractors (54.2%) and subcontractors (45.9%) added an allowance for time in their bid. This was not unexpected and is most likely due to the nature of the estimating process. Contractors typically will first estimate the total man-hours for a task and adjust the schedule due to the type work, season of the year and expected weather for their location. The survey also indicates general contractors (62.5%) and subcontractors (67.6%) were successful in gaining an extension of time for weather delays (typically abnormally severe weather). It is not deducible from this survey what percent, if any, of the allowances added and extensions gained overlap on the same contract. Additionally, some contractors (27.9%) add a monetary allowance to their bids. Numerous contractors (27.9%) also stated they were successful in claims for additional cost.

**Table 10: Bid Allowances for Delays, Errors, and Omissions**

Contract Condition	Rate	General Contractors						Subcontractors						Total Respondents					
		Yes	No	NA	Yes	No	NA	Yes	No	NA	Yes	No	NA	Yes	No	NA	Yes	No	NA
Weather	%	54.2	37.5	8.3	25.0	58.3	16.7	45.9	51.4	2.7	29.7	67.6	2.7	49.2	45.9	4.9	27.9	63.9	8.2
	No.	13	9	2	6	14	4	17	19	1	11	25	1	30	28	3	17	39	5
Industrial Disputes	%	8.3	70.8	20.8	4.2	62.5	33.3	2.7	83.8	13.5	5.4	83.8	10.8	4.9	78.7	16.4	4.9	75.4	19.7
	No.	2	17	5	1	15	8	1	31	5	2	31	4	3	48	10	3	46	12
Inflation	%	4.2	83.3	12.5	29.2	54.2	16.7	8.1	78.4	13.5	35.1	56.8	8.1	6.6	80.3	13.1	32.8	55.7	11.5
	No.	1	20	3	7	13	4	3	29	5	13	21	3	4	49	8	20	34	7
Architect	%	25.0	70.8	4.2	45.8	45.8	8.3	37.8	56.8	5.4	37.8	56.8	5.4	32.8	62.3	4.9	41.0	54.1	4.9
	No.	6	17	1	11	11	2	14	21	2	14	21	2	20	38	3	25	33	3
Delays, Errors, & Omissions	%	25.0	70.8	4.2	41.7	45.8	12.5	40.5	51.4	8.1	45.9	48.6	5.4	34.4	59.0	6.6	44.3	47.5	8.2
	No.	6	17	1	10	11	3	15	19	3	17	18	2	21	36	4	27	29	5
Engineer	%	29.2	66.7	4.2	45.8	45.8	8.3	35.1	62.2	2.7	37.8	59.5	2.7	32.8	63.9	3.3	41.0	54.1	4.9
	No.	7	16	1	11	11	2	13	23	1	14	22	1	20	39	2	25	33	3
Delays, Errors, & Omissions	%	16.7	58.3	25.0	20.8	50.0	29.2	32.4	64.9	2.7	40.5	56.8	2.7	26.2	62.3	11.5	32.8	54.1	13.1
	No.	4	14	6	5	12	7	12	24	1	15	21	1	16	38	7	20	33	8
Client	%	20.8	70.8	8.3	33.3	58.3	8.3	21.6	75.7	2.7	24.3	73.0	2.7	21.3	73.8	4.9	27.9	67.2	4.9
	No.	5	17	2	8	14	2	8	28	1	9	27	1	13	45	3	17	41	3
General Contractor	%	20.8	70.8	4.2	16.7	75.0	8.3	16.2	81.1	2.7	21.6	75.7	2.7	18.0	78.7	3.3	19.7	75.4	4.9
	No.	5	17	1	4	18	2	6	30	1	8	28	1	11	48	2	12	46	3
Delays, Errors, & Omissions	%	4.2	87.5	8.3	0.0	87.5	12.5	10.8	86.5	2.7	10.8	86.5	2.7	8.2	86.9	4.9	6.6	86.9	6.6
	No.	1	21	2	0	21	3	4	32	1	4	32	1	5	53	3	4	53	4
Suppliers	%	16.7	75.0	8.3	8.3	79.2	12.5	16.2	81.1	2.7	13.5	56.8	2.7	16.4	78.7	4.9	11.5	82.0	6.6
	No.	4	18	2	2	19	3	6	30	1	5	21	1	10	48	3	7	50	4
Delays, Errors, & Omissions	%	16.7	75.0	8.3	8.3	79.2	12.5	16.2	81.1	2.7	13.5	56.8	2.7	16.4	78.7	4.9	11.5	82.0	6.6
	No.	4	18	2	2	19	3	6	30	1	5	21	1	10	48	3	7	50	4
Delays of Authorities	%	16.7	75.0	8.3	8.3	79.2	12.5	16.2	81.1	2.7	13.5	56.8	2.7	16.4	78.7	4.9	11.5	82.0	6.6
	No.	4	18	2	2	19	3	6	30	1	5	21	1	10	48	3	7	50	4

Table 11: Success in Gaining Time Extension or Additional Cost

## **Industrial Disputes and Inflation**

Industrial disputes and inflation were the least likely situations for which both general contractors and subcontractors stated they added a risk allowance to their bids. From the total responses, only 4.9% stated they added a time and/or monetary allowance for industrial disputes; 6.6% added a time allowance for inflation. The escalation of cost due to inflation was considered more critical as indicated by 32.8% of the respondents who stated they added a cost contingency in their bids for inflation. It should be noted that the results for industrial disputes may be skewed or may relate to other than labor unions since 83% of the respondents were nonunion. Employees have significant rights under the National Labor Relations Act (NLRA) even if they are not currently represented by a union.

## **Delays, Errors, and Omissions**

### Architect or Engineer

Delays, errors, and omissions due to the Architect or Engineer often adversely affect the construction project at all levels and may arise in many different stages of the project. They may stem from within the original plans and specifications, shop drawings, field modifications and changes in the work, the submittal process, performance schedules, and approval of progress payments. A risk which may not be so obvious or easy to quantify is that subcontractors appear to have acquired significant design responsibility because the architect's review is typically for the "limited purpose of checking for conformance" with the "design concept" (AIA). Additionally, most contract types, for example AGC ¶ 15.1, impose an obligation on the subcontractor to advise the general contractor of its discovery of any inconsistencies or omissions in the contract documents. These requirements also impose a secondary design burden on the subcontractor - an unreasonable transfer of liability for design errors and omissions that more properly should rest with the architect or engineer.

Overall, the survey respondents were relatively consistent in adding risk allowances for time (architects - 32.8%; engineers 34.4%) and cost (architects - 41.0%; engineers - 44.3%). Success in claims was high, ranging from 60% to 65%. Survey results showed that of the respondents,

subcontractors were more likely to add a risk allowance in their bids for delays, errors, and omissions of architects and engineers, except for cost in the case of architects. Although the results were consistent between general contractors and subcontractors, the subcontractors were slightly less successful in gaining additional time or cost. An influential factor may be the fact that the subcontractor is at a greater disadvantage since, as a third party, it has no contractual or legal relationship with the architect and/or engineer. The subcontractor must assert whatever contractual rights and remedies it may have solely against the general contractor. This works to the detriment of the subcontractor, especially when an insolvent general contractor leaves the subcontractor without a responsible party from whom to recover.

#### Client (Owner)

Delays, errors, and omissions caused by the client include miscoordination of scheduling (e.g. multiple prime contractors or renovations with tenants), client furnished equipment, payment and labor disputes with the construction manager or A/E, insufficient information supplied to A/E, general contractor, and/or contract manager and requests for changed work. In any case, the effect is generally felt down through all tiers of the project. Overall, 32.8% of the respondents stated they would add a time adjustment to their bid schedule and 41.0% would include a monetary allowance. Respondents also stated they were generally successful in obtaining a time extension (57.4%) and a cost adjustment (62.3%).

#### General Contractor

Subcontractors often encounter delays due to the acts or omissions of the general contractor. Typically, the general contractor is the only party in privity of contract with the subcontractor. Therefore, all subcontractor product data, samples and other submittals, requests for additional information, periodic progress reports, and change order requirements are forwarded through the general contractor. Often, general contractors will gather submittals required in a particular area from appropriate subcontractors before forwarding. Additionally, the general contractor has the most control over the project schedule as a whole, which is now not simply an estimate but critical milestones and firm commitments to the client, under which the subcontractor is required to perform. Under these conditions it is easy for any delays, errors, and omissions by the general

contractor, regardless of the trade or subcontractor directly involved, to subsequently impact the work and/or schedules of all subcontractors on the project.

Of the subcontractors responding to the survey, 32.4% stated they add a risk allowance for time and 40.5% will add a monetary allowance to their bids. Additionally, the survey indicated the subcontractors were generally successful in obtaining both a time extension (56.8%) and additional cost (45.9%) from the general contractor.

Another interesting survey, conducted by George Birrell (1986) attempted to define a large set of criteria, the cost and time-sensitive factors, by which general contractors could improve their performance and profitability. Subcontractors evaluated their own performance when working with a general contractor who performed very well or very poorly against the criteria. Results indicated there could be an average of 9% savings or 16% loss on the cost of subcontractor work due to the performance of the general contractor. Additionally, there could be a significant effect on the calendar duration, from a reduction of 17.5% to an overrun of 22.2%, due to the performance of the general contractor against the criteria. Thus, the subcontractor's initial bid would be lower because of the general contractor's expected high quality of management.

#### Your Own Errors and Omissions

Not surprisingly, survey respondents were more reluctant to add an allowance to their bids for their own delays, errors, and omissions. However, 21.3% included time allowances and 27.9% included monetary allowances. Overall, they were equally unsuccessful in obtaining time and monetary additions. None of the general contractors stated they were successful in either claim situation. Subcontractors indicated somewhat more success in gaining time extensions (8.1%) and additional cost (5.4%). Several factors may contribute to the subcontractors' limited success. The most obvious factor is the general contractors' reluctance to enter into costly arbitration and risk damaging future working relationships with a competent subcontractor.

#### Other Subcontractors

Subcontractors consistently depend on other subcontractors on the project site, or at the very least, their work is typically dependent on the task completion or timeliness of others. Delays,

errors, and/or omissions on the part of one subcontractor on the project site invariably impacts the others. Possibly due to this interdependency, over which no one subcontractor has a reasonable amount of control, subcontractors responding to the survey stated they add a risk allowance in their bids for time (16.2%) and cost (21.6%). This was also considered one of their least successful areas in which to gain a time extension (27.0%) or claim for additional cost (29.7%). A small portion of general contractors, although they have more control in scheduling and coordinating the work, also realize this compounding effect and add a risk allowance in their bids for time (20.8%) and cost (16.7%).

#### Suppliers

A troublesome area is that a material supplier or other firm not engaged in performing work on the site (a fabricator, for example) is not a subcontractor or a sub-subcontractor under the terms of the contract, nevertheless, they are often essential to the performance of the work. Delays, errors, and omissions of suppliers can easily impact all tiers of the contract. Survey results indicate that most parties consider this area the sole responsibility and a risk to be accepted by the contractor/subcontractor who is engaged in the direct business with the supplier. Overall, the responses were similar with 8.2% stating they added a contingency to cover delays in the schedule, and 6.6% added a contingency to cover unexpected costs. Success in gaining time extensions (9.8%) and additional cost (11.5%) was low among all contractors responding.

#### Delays of Authorities

The survey indicated that, to a lesser extent, contractors also added risk allowances to their bids for the delays of authorities. Of the respondents, 16.4% and 11.5% added contingencies for time and cost respectively; 27.9% stated they were generally successful in gaining a time extension and 16.4% were successful in gaining a claim for additional cost.

## **Summary, Inferences, and Conclusion**

### **Summary of Responses**

The main objective of this study was to identify the risks in construction contract agreements which contractors perceive as most affecting their bids. The assumption was made that the contractor's willingness to add a risk allowance to its bid for specified contract conditions is related to its perceived level of risk. The survey focused on identifying critical risks in two major areas: general contract conditions, and typical delays, errors, and omissions relative to the construction contract. For the same delays, errors, and omissions, the contractor's success in gaining an extension of time or additional cost was identified. Additionally, the survey was concerned with evaluating the fairness of standard subcontract documents. Results of the present survey revealed the following:

- Both general contractors and subcontractors often include an allowance for risk in their bids, both for time and additional cost.
- Responses indicated that subcontractors, who frequently are responsible for a major portion of the actual construction on a project, are more likely to include a risk allowance than general contractors.
- Subcontractors perceived the most critical general contract conditions to be the terms of payment and retention release date, the conditions which most directly affect their immediate financial stability and cash flow. General contractors ranked these third and fifth respectively.
- General contractors perceived the most critical general contract conditions to be changed quantities and liquidated damages, which ranked the least critical among subcontractors.
- The delays, errors and omissions of architects, engineers and clients ranked closely as the most critical risks for both general contractors and subcontractors in both time and cost. The one exception was risk allowances for time due to weather delays, which was ranked as the highest critical risk of any of the delays by both groups. Subcontractors also included the delays, errors and omissions of general contractors among the highest.

- Success in contractor claims for time extensions and additional cost followed the same trends as risk allowances, the highest being time extensions for severe weather, and claims for both cost and time due to the delays, errors and omissions of architects, engineers and clients.
- On average, both general contractors and subcontractors rated the standard contract general conditions as fair, although the subcontractor's responses were more widely dispersed on the scale.

The difference in the perceived level of risk is directly related to the uncertainty of the conditions, the expected potential loss, and the contractor's ability to exercise reasonable control over the risk. Influencing factors may also include the contractor's history of success in securing monetary and/or time extensions and in winning claims for the particular occurrence of the risk event.

## **Inferences**

The insight gained through this limited survey was that subcontractors do not appear to consider themselves at a decided disadvantage when entering into agreements with general contractors. The trends in risk perception were similar between general contractors and subcontractors with no paramount conditions for which subcontractors perceived more risk. Additionally, the similarity in the responses to success in claims may reasonably indicate that general contractors are passing a majority of their success in negotiating time extensions and additional cost down to the appropriate subcontractors.

In general, there were no inconsistencies noted in the survey results which would indicate that subcontractors are exposed to harsher or more risky contract conditions. The majority of the respondents, both general contractors and subcontractors, stated they considered the standard contract conditions to be fair. This in itself does not imply that all subcontract conditions in general are fair as only 18% of the total respondents used a standard contract form between 75 and 100 percent of the time. Respondents also stated they used nonstandard forms (30%) and

contractor written forms (21%) over 75 percent of the time. No questions were asked regarding the fairness of nonstandard and contractor prepared forms.

From the limited survey data, it cannot be suggested which of the contracting parties bear the most risk, or if the risk is allocated properly for the conditions which the respondents indicated as the most critical. However, with few exceptions, subcontractors will more frequently include a contingency, which indicates they perceive the risk to be more critical. There are numerous factors which influence the perception of risk, most importantly, the amount of control the subcontractor maintains over the risk event and its potential loss. In both areas, the subcontractor may be least equipped to handle the risk.

What is intuitively obvious is that it is the client who will ultimately bear the cost of the risk. First, the client must accept an increased overall project cost due to risk allowances added by general contractors and subcontractors intended to protect their interests in the event of a risk occurrence. Since analysis of the responses indicated general contractors and subcontractors often perceive the same risk conditions, it is feasible that the subcontractor(s) may add a contingency in their bids for a particular condition and the general contractor may include an additional contingency. Given the frequency with which risk allowances are added, it is also feasible to suggest that this may happen for more than one risk condition on a single project. Therefore, the owner, who originally transferred the risk to the general contractor in the contractual agreement, continues to bear the cost of the risk with an additive factor.

Second, the survey results showed the highest rates of contractor success in claims to be for the same conditions which also had the highest frequency of risk allowances. Therefore, if the risk event does occur, the client may pay an additional cost relative to the contractor's claim. Finally, if the risk allowance added by the contractor is not sufficient to cover the financial losses, the contractor may find other methods to reduce losses by cost cutting measures which may affect quality. In the worst of conditions, the subcontractor could be forced into bankruptcy. Therefore, the client may not only pay the direct costs associated with risk, but also the indirect. Exceptions where the client typically does not bear the majority of the cost of risk include

inflation and risks associated with the delays, errors, and omissions caused directly by the general contractor or subcontractor. These risk events ranked among the lowest risk for which a contingency was included and also lowest in the contractor's success in claims.

## **Conclusion**

The proper allocation of risk in construction contracts to the party who is most qualified and best capable of exercising reasonable control over the risk may reduce the overall project duration, cost, and risk to other parties. The general contractor and subcontractors would be better able to identify and control the risks they retained and decrease the risk allowance in their bids.

Accordingly, the client would pay only for the differing site conditions actually encountered during the work, and additions, delays, errors, and omissions for which he and the Architect/Engineer are responsible.

Since subcontractors frequently provide a substantial amount of the actual construction on a project, equitable subcontract conditions are the key to the success of the project. The presence of unfair subcontracting practices may increase the client's risk either through the insolvency of subcontractors, increased claims and disputes, project time delays, and cost cutting measures which affect quality.

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## Appendix: Survey Questionnaire

## Risks in Subcontracting

Thank you for participating in our study. All responses will remain confidential and be reported anonymous. If you would like to add any comments, they would be greatly appreciated. Please feel free to do so.

Please check the most appropriate response for your firm.

1. What percentage of the time does your firm use AIA contract documents?

( ) 0 to 25% ( ) 51% to 75%  
( ) 26% to 50% ( ) 76% to 100%

2. What percentage of the time does your firm use a contract that is not a "standard form" document for example , AIA, AGC, EJC?

( ) 0 to 25% ( ) 51% to 75%  
( ) 26% to 50% ( ) 76% to 100%

3. Do you insist that you know subcontract conditions related to a job when preparing a bid?

4. How would you rate the fairness of standard subcontract general conditions, such as AIA-201 and AIA-401 on a scale of 1-5 ?

5. Do you make a risk allowance in your bid for subcontract general conditions you feel are biased against you?

6. How often does your firm write their own contracts (instead of using standard forms)?

( ) 0 to 25% ( ) 51% to 75%  
( ) 26% to 50% ( ) 76% to 100%

7. Do you add extra days to the schedule for activities with a high potential for being delayed by weather?

8. Do you add extra dollars to contingency when the project has a high potential for being delayed and the liquidated damages assessed are high?

9. What do you think are the most important subcontract conditions affecting financial risk?  
 Indicate the level of importance.

ITEM	LEVEL OF IMPORTANCE				
	Most Important (5)	(4)	Moderately Important (3)	(2)	Not Important (1)
1. Terms of payment					
2. Extension of time					
3. Inflation					
4. Liquidated damages					
5. Delays and delay costs					

10. For which of the following and with what frequency do you make time or monetary risk allowances in your bid?

ITEM	FREQUENCY OF RISK ALLOWANCE IN BID				
	Always	Usually	Sometimes	Almost Never	Never
1. Extension of time					
2. Terms of payment					
3. Retention release date					
4. Changed Quantities					
5. Liquidated damages					
6. Cost of arbitration					
7. Delays and cost of delays					
8. Completeness of contract documents					
9. Fluctuating material and labor costs					
10. Short notice to commence work					
11. Transfer of responsibility (exculpatory clauses)					

11. Do you generally make allowances in your bid for delays, errors, and omissions in the project schedule or bid price?

Are you generally successful in gaining an extension of time or claim for additional cost for the situations described below?

ITEM	Risk Allowance in Bid for:				Success in Claims for:			
	TIME		COST		TIME		COST	
	YES	NO	YES	NO	YES	NO	YES	NO
1. Weather								
2. Industrial disputes								
3. Inflation								
4. Delays, errors and omissions of architect								
5. Delays, errors and omissions of engineer								
6. Delays, errors and omissions of client								
7. Delays, errors and omissions of general contractor								
8. Your own errors and omissions								
9. Delays, errors and omissions of other subcontractors								
10. Delays, errors and omissions of suppliers								
11. Delays of authorities (inspections and permits)								

12. Are you aware of the new AGC Subcontract form? Yes No

If Yes, have you used the new AGC Subcontract form? Yes No

If Yes, do you have any comments you would like to share on its use, either positive or negative?

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13. Concerning coordination of work with multiple subcontractors on a project. Approximately what percentage of the time have you experienced problems on items with common responsibility (such as Safety, Clean-up)?

0% to 25%  51% to 75%  
 26% to 50%  76% to 100%

14. Approximately what percent of the time has your firm been adversely affected by bid shopping?

0% to 25%  51% to 75%  
 26% to 50%  76% to 100%

15. Approximately what percent of the time has your firm been positively affected by bid shopping?

0% to 25%  51% to 75%  
 26% to 50%  76% to 100%

16. Would you describe any significant recent experiences your firm has had concerning Bid Shopping and how your firm manages it?

### General Characteristics of Firm

17. Type of firm:

General Contractor       Specialty Contractor,      Type:

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18. Size of firm: Gross Revenues

- ( ) <\$100,000
- ( ) \$100,000 to \$200,000
- ( ) \$200,000 to \$500,000
- ( ) \$500,000 to \$1,000,000
- ( ) \$1,000,000 to \$10,000,000
- ( ) >\$10,000,000

### 19. Structure of firm:

- Sole proprietor
- Partnership
- Privately held corporation
- Publicly held corporation

20. Type of work done by your firm:

## 21. Percentage of work done with own forces?

( ) 0% to 25% ( ) 50% to 75%  
( ) 25% to 50% ( ) 75% to 100%

22. With respect to labor relations, is your firm?

Non-Union  
 Union  
 Double-Breasted

**23. How long has your firm been in business?**

- ( ) 1-5 yrs
- ( ) 5-10 yrs
- ( ) 10-15 yrs
- ( ) >15 yrs

24. Would you like to receive a synopsis of the results of this survey? If yes would you please respond with your name and address.

25. Would you be willing to participate in future surveys?